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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/819,613	03/29/2001	Yasuo Okutani	862.C2178	4198

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EXAMINER	
NOLAN, DANIEL A	

ART UNIT	PAPER NUMBER
2654	11

DATE MAILED: 04/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/819,613	Applicant(s) OKUTANI ET AL.	
	Examiner Daniel A. Nolan	Art Unit 2654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 March 2004* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *4,5,11 and 12* is/are allowed.

6)☒ Claim(s) *1-3,6-10 and 13-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *23 March 2004* is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *10* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Response to Amendment

2. The response filed 23 March 2004 was filed to the following effect:

- The title was changed as indicated and the objection is withdrawn as satisfied.
- The specification was changed as indicated and the objection is withdrawn.
- The claims were changed as indicated and the objections are withdrawn as satisfied.

Response to Arguments

3. Applicant's arguments filed 23 March 2004 have been fully considered but they are not persuasive.

- Regarding claims 1 and 8, the HMM of the cited prior art is used as claimed, as indicated in the Abstract of Komori *et al*, which teaches that "*1st output probabilities are formed for inputted speech using the small number of mixtures type HMM and 2nd output probabilities are formed for the input speech using the large number of mixtures type HMM for selected states corresponding to the highest output probabilities of the 1st type HMM.*

- The added component, which details the activity of the *segment is*, in fact, *being registered* has been addressed explicitly as a feature of the claim.

Drawings

4. The replacement drawing (figure 6) was received on 23 March 2003.

The drawing is accepted.

Claim Rejections - 35 USC § 103

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Maddox, Komori *et al*'975 & '396 & Chu

6. Claims 1, 6, 8, 13, 15, 17, 18, 20, 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maddox (U.S. Patent 6,000,024 A) in view of Komori *et al*'975

(U.S. Patent 5,812,975) and further in view of Komori *et al*'396 (U.S. Patent 5,787,396) and further in view of Chu (U.S. Patent 6,374,210 B1).

7. Regarding claims 1 and 8, the invention for a parallel computing system by Maddox reads on the feature of the claim for *a speech signal processing apparatus* as follows:

- Maddox (column 6 lines 44-46) reads on the feature of a *speech segment search means for searching a speech database for speech segments that satisfy a phonetic environment;*
- Maddox does not mention HMM. The state transition model design and voice recognition of Komori *et al*'975 (column 3 lines 32-38) reads on the feature of *HMM learning means for computing HMMs of phonemes on the basis of a search result of* that *speech segment search means* and (column 6 lines 52-53) reads on the feature of *segment recognition means for performing segment recognition of the speech segments on the basis of the HMMs of the phonemes;*
- Maddox does not mention registering segments. The speech recognition method of Komori *et al*'396 (column 4 lines 24-30) reads on the feature of *registration segment determination means for determining a speech segment to be registered in a segment dictionary in accordance with a segment recognition result of* that *segment recognition means.*
- It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Komori *et al*

to the device/method of Maddox so that differences in phone environments – such as preceding and succeeding phones – can be classified finely.

With regard to the additional feature of the claim that *registration segmentation means for determining (selecting) a speech segment used in the computation of the HMMs by the HMM learning means and registering the speech segment in a segment dictionary in accordance with (the) segment recognition result (of the segment recognition means),* Komori *et al* indicates that HMM makes a contribution to *registering a speech segment in a segment dictionary* (105→108 in figure 1, 204→208 in figure 2, etc.) without disclosing the mechanism depicted. Chu, with the invention fot the *automatic segmentation of a text,* reads on this further feature of *registering the speech segment in a segment dictionary* with the update function (140 in figure 1 – see column 7 lines 30-33). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Chu to the device/method of Maddox & Komori *et al* to incorporate new words/segments into the segment lexicon (dictionary).

8. Regarding claims 6 and 13 as understood by the Examiner; the claims are set forth with the same limits as claims 1 and 8, respectively. Maddox does not mention registering segments. Komori *et al*[396] (2032 in figure 8) reads on the feature of *speech segments having likelihood not less than a predetermined value registered in the segment dictionary* which would have made it obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method and/or

teachings of Komori *et al*'396 to the device/method of Maddox so as to have recognition results reflect an acceptable comparison.

9. Regarding claim 15, the claim is set forth with the same limits as claim 8. Maddox (claim 7 line 32) reads on the feature of *a computer readable storage medium storing a program for implementing a method cited.*

10. Regarding claims 17 and 20, the features of the claims are the same as those found in claims 1 and 8 and the claims are rejected for the same reasons.

11. Regarding claims 18 and 21; the claims are set forth with the same limits as claims 17 and 20, respectively. Maddox is silent as to use of HMM. Komori *et al*'396 (column 4 lines 15-31) reads on the feature that *obtains a maximum likelihood HMM which has a maximum likelihood with one of the plurality of speech segments from the HMMs corresponding to the phonemes, checks if the one speech segment is a speech segment used in learning of the maximum likelihood HMM, and selects the one speech segment when the one speech segment is a speech segment used in learning of the maximum likelihood HMM.* It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method and/or teachings of Komori *et al* to the device/method of Maddox so as to process faster without reducing recognition accuracy.

12. Regarding claim 23, the claim is set forth with the same limits as claim 20. Maddox (claim 7 line 32) reads on the feature of *a computer readable storage medium storing a program for implementing a method cited.*

Maddox, Komori *et al*'975 & '396, Chu & Rosenberg

13. Claims 2 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maddox in view of Komori *et al*'975 and further in view of Komori *et al*'396 and further in view of Chu and further in view of Rosenberg ("Connected Sentence Recognition Using Diphone-Like Templates" International Conference on Acoustics, Speech, and Signal Processing, April 1988).

14. Regarding claims 2 and 9; the claims are set forth with the same limits as claims 1 and 8, respectively. Maddox is silent on the feature of diphones or biphones. Rosenberg (lines 7-9 left column page 473) reads on the feature that *segment recognition means adopts diphones as units of the phonemes, categorizes speech segments into four categories CC, CV, VC, and VV (C: a consonant, V: a vowel), and performs segment recognition in each category* (in the end of that paragraph). It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Rosenberg to the device and/or method of Maddox, Komori *et al*'975 & '39 & Chu because defining units larger than phones will be easier to work with, segment and label by virtue of containing greater variations and context effects.

Maddox, Komori *et al*'975 & '396, Chu & Tominaga

15. Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maddox in view of Komori *et al*'975 and further in view of Komori *et al*'396 and further in view of Chu and further in view of Tominaga (U.S. Patent 5,311,429 A).

16. Regarding claims 3 and 10; the claims are set forth with the same limits as claims 1 and 8, respectively. Maddox does not mention registering segments.

The speech recognition method of Komori *et al*'396 (column 4 lines 24-30) reads on the feature of *determining a speech segment to be registered in a segment dictionary in accordance with a segment recognition result of* that *segment recognition.*

The *maintenance support method and apparatus for natural language processing system* of Tominaga (column 11 lines 19-36) reads on the feature that *checks if a speech segment pattern which matches a speech segment that is not successfully recognized by* that *segment recognition means, and registers that speech segment in the segment dictionary if the corresponding speech segment pattern is found.*

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Komori *et al* & Tominaga to the device/method of Maddox, Komori *et al*'975 & '39 & Chu to avoid duplicate entries.

Maddox, Komori *et al*'975 & '396, Chu & Richardson *et al*

17. Claims 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maddox in view of Komori *et al*'975 and further in view of Komori *et al*'396 and further in view of Chu and further in view of Richardson *et al* (U.S. Patent 5,926,784 A).

18. Regarding claims 7 and 14; the claims are set forth with the same limits as claims 6 and 13, respectively. Maddox does not mention registering segments.

In *natural language parsing using Podding,* Richardson *et al* (column 1 lines 21-25) reads on the feature that *registers, in the segment dictionary, speech segments having upper values* (claims 39 and 41) *obtained by normalizing the likelihood by durations of the speech segments or likelihood having the values not less than a predetermined value.*

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Richardson *et al* to the device/method of Maddox, Komori *et al*'975 & '39 & Chu to improve the efficiency by assigning probabilities to syntax rules.

Maddox, Komori *et al*'975 & '396, Chu, Tominaga, Fukada *et al* & Huang *et al*'193

19. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maddox in view of Komori *et al*'975 and further in view of Komori *et al*'396 and further in view of Chu and further in view of Tominaga and further in view of Fukada *et al* (U.S. Patent 5,845,047 A) and further in view of Huang *et al*'193 (U.S. Patent 5,913,193 A).

20. Regarding claim 16, the claim is set forth with the same limits as claim 8. The feature of *a segment dictionary in which speech segments are registered* is *cited in claim 8* and the rejections are applied to this claim for the same reasons.

Where Maddox is silent on the subject of *language analysis,* Tominaga (column 3 lines 46-56) reads on the feature *for performing language analysis of input text data.*

Where Maddox is silent on the subject of *prosody,* Fukada *et al* (column 6 line 59) reads on the feature of *generating prosody on the basis of an analysis result of* that *language analysis means* and the *runtime acoustic unit selection for speech synthesis* of Huang *et al*'193 (column 3 lines 1-4) reads on the feature that *search* that *segment dictionary on the basis of the prosody generated by* that *prosody generation means to select corresponding speech segments* and, with (column 1 line 66) reads on *modifying and concatenating the speech segments selected by* that *speech segment selection means and* (132 in figure 5) *for reproducing speech on the basis of the result modified by* that *speech segment modification/concatenation means.*

It would have been obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Tominaga, Fukada *et al* & Huang *et al*'193 to the device/method of Maddox, Komori *et al*'975 & '39 & Chu so as to improve the quality of synthetic speech by considering additional attributes of language.

Maddox, Komori *et al*'975 & '396, Chu & Huang *et al*'193

21. Claims 19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maddox in view of Komori *et al*'975 and further in view of Komori *et al*'396 and further in view of Chu and further in view of Huang *et al*'193 (U.S. Patent 5,913,193 A).

22. Regarding claims 19 and 22; the claims are set forth with the same limits as claims 17 and 20, respectively. Maddox is silent as to *speech synthesis.* Huang *et al*'193 (36 in figure 1) reads on the feature of *producing synthetic speech using the segment dictionary* (22→→36 in figure 1) ... which would have made it obvious to a person of ordinary skill in the art of speech signal processing at the time of the invention to apply the method/teachings of Huang *et al* to the device/method of Maddox, Komori *et al*'975 & '39 & Chu so as to generate natural-sounding speech.

Allowable Subject Matter

23. Claims 4-5 and 11-12 are allowed.

24. The following is a statement of reasons for the indication of allowable subject matter:

- The present invention is directed to building and maintaining speech segment dictionaries.

- Claims 4 and 11 identify the uniquely distinct feature that "*registers a speech segment in the segment dictionary when the number of speech segments recognized is not less than a predetermined value*."

  The closest prior art, Yokota *et al*, discloses *registering recognized speech segments* but fails to anticipate or render the above underlined limitations obvious.
- Claims 5 and 12 depend on claims that were found to be allowable and so would they be allowed as a consequence.

25. As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

Conclusion

26. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Goronzy *et al* (U.S. Patent Publication 2002/0095282 A1)method for online adaptation of pronunciation dictionaries.
- Shibata (U.S. patent 5,678,054 A) data searching device.

27. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

28. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Daniel A. Nolan at telephone (703) 305-1368 whose normal business hours are Mon, Tue, Thu & Fri, from 7 AM to 5 PM.

If attempts to contact the examiner by telephone are unsuccessful, supervisor Richemond Dorvil can be reached at (703)305-9645.

The fax phone number for Technology Center 2600 is (703)872-9314. Label informal and draft communications as "DRAFT" or "PROPOSED", & designate formal communications as "EXPEDITED PROCEDURE". Formal response to this action may be faxed according to the above instructions,

or mailed to: Mail Stop AF (or CPA, etc. – see Official Gazette, 04 November 2003)
P.O. Box 1450
Alexandria, VA 22313-1450

or hand-deliver to: Crystal Park 2,
2121 Crystal Drive, Arlington, VA,
Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to Technology Center 2600 Customer Service Office at telephone number (703) 306-0377.

Daniel A. Nolan
Examiner
Art Unit 2654

DAN/d
April 8, 2004

RICHEMOND DORVIL
SUPERVISORY PATENT EXAMINER